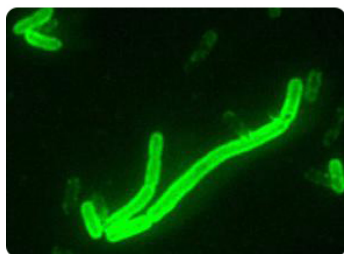


LIVERMORE LAB REPORT

A weekly review of scientific and technological achievements from Lawrence Livermore National Laboratory, Jan. 27-31, 2014.



A NEW STRAIN OF BLACK DEATH?



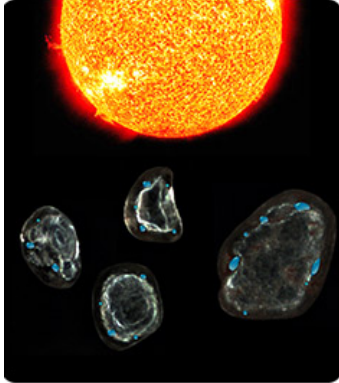
***Yersinia pestis* (Black Death) is the pathogen believed to be responsible for millions of deaths in the 1300s. (Photo: CDC/ Courtesy of Larry Stauffer, Oregon State Public Health Laboratory)**

A new strain of the Black Death -- which killed half the people in the world in the 14th century -- could emerge without warning, scientists say. And while modern medicine would help combat such an outbreak, the ease with which people move around the globe could make it worse.

Previously, scientists thought that the bubonic plague bug, *Yersinia pestis*, had jumped from rodents to humans just once and was now under control. But an analysis of Black Death samples from London victims shows that the disease that killed off millions of people may not have worked alone.

Lawrence Livermore biochemist Crystal Jaing analyzed 5,000 DNA fragments from Black Death victims and was able to identify many dangerous pathogens in less than 24 hours. What she found is that many of the Black Death victims also contracted tetanus. The conclusion is that deadly pathogens in concert with the plague may be the reason Black Death turned into a super killer.

To see more, go to the [Canadian Broadcasting Corp.](#)



The surfaces of tiny interplanetary dust particles are space-weathered by solar wind, causing amorphous rims to form on their surfaces, where researchers discovered water.

An alien walks into a bar. The alien asks for water and the bartender hands him a piece of space dust. A new look at stardust indicates that it contains water, which could mean there are other life forms out there beside those on Earth.

Former researchers at Lawrence Livermore used electron microscopy to examine interplanetary dust collected from Earth's outer atmosphere. They found that tiny particles contained pockets of water -- presumably created by interactions between the dust with the "solar wind." This water could be the key to life in other galaxies.

As John Bradley, former director of the Institute of Geophysics and Planetary Physics at the Lab and the research leader, said: "The two key ingredients for life on Earth are water and organic material. These particles arrived at the top of the atmosphere with both of the key ingredients for life."

To read more, go to the [Huffington Post](#).

EDMONTON JOURNAL THE PATH TO FUSION



Inside the NIF laser bay. Scientists are close to achieving the first burn on the path to fusion.

After decades of promise, the buzz is overwhelming in the world of physics that fusion is not that far off.

Lawrence Livermore scientists working at the National Ignition Facility are moving closer to achieving the first "burn" of a hydrogen fuel pellet that will likely prove to the world the process that powers the sun can be achieved on Earth.

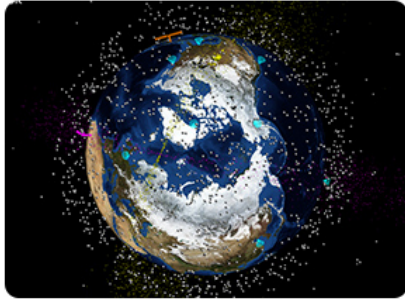
Fusion is the process that powers our sun and all stars. But the scientific and technological hurdles are immense.

So far, the NIF scientists are receiving energy back from the fuel during their single test shots. The results vary as they make subtle adjustments to the timing and energy input with each new shot.

To read more, go to the [Edmonton Journal](#).



STARE INTO THE SKY



Collisions between satellites and space debris are becoming more common. Lawrence Livermore researchers are working on a technique to decrease the risk of such accidents.

Researchers from the Lawrence Livermore National Laboratory have developed and tested a series of ground-based mini-satellites that will be used in the future to help control traffic in space.

These "space cops" were used by the LLNL team to capture a series of six images over a 60-hour period to prove that they can be used to alter the orbit of other probes traveling in low-earth orbit. The plan is to use the satellite network to help prevent collisions of satellites and space debris.

The research is part of LLNL's Space-Based Telescopes for Actionable Refinement of Ephemeris (STARE) mission, which is an effort to prevent these types of collision scares. STARE will consist of a constellation of low-earth orbit nano-satellites designed to refine the orbits of satellites and space debris to 100 meters.

To read more, go to [*Red Orbit*](#).



DEEP CORALS TAKE ON CLIMATE CHANGE



A Lawrence Livermore scientist and collaborators have studied coral to determine that a long-term shift in nitrogen content in the Pacific Ocean has occurred as a result of climate change. Image courtesy of NOAA Hawaii Undersea Research Laboratory.

By looking at one of the oldest organisms in the ocean, researchers from the Lawrence Livermore National Laboratory and the University of California, Santa Cruz found that overall nitrogen uptake in the North Pacific Ocean has increased by about 20 percent since the mid 1800s, and this long-term change appears to be continuing today.

Using chemical information locked in organic skeletal layers, the team used these ancient deep sea corals as detailed recorders of changes at the base of the open Pacific food web over the last 1,000 years. This represents the first detailed biogeochemical records for the planet's largest contiguous ecosystem.

Time series data near Hawaii have shown dynamic decadal scale variability. But the new records from deep sea corals show that the decadal-scale time series changes are really only small oscillations superimposed on a dramatic long-term shift at the base of the Pacific ecosystem.

"This also has very significant implications about how we understand, and perhaps, can better predict effects of global warming in the Pacific, but also likely in other subtropical regions," Tom Guilderson of LLNL said.

To read more, go to the [Hawaii Star](#).

LLNL applies and advances science and technology to help ensure national security and global stability. Through multi-disciplinary research and development, with particular expertise in high-energy-density physics, laser science, high-performance computing and science/engineering at the nanometer/subpicosecond scale, LLNL innovations improve security,

meet energy and environmental needs and strengthen U.S. economic competitiveness. The Laboratory also partners with other research institutions, universities and industry to bring the full weight of the nation's science and technology community to bear on solving problems of national importance. To send input to the *Livermore Lab Report*, send [e-mail](#)